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Department of the Interior

What is a Shift?

- What can cause a shift?
- Why negative and positive shifts?
- When to shift or when to draw a new rating?

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What is a Shift?

- A shift is a ***temporary*** change to the stage-discharge relation defined by the base rating in use at the time.
- It is caused by a ***temporary*** change to the control – debris on the control or scour to the control.
- Debris on the control causes negative shifts.
- Scour to the control causes positive shifts.

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What can cause shifts?

- Weed growth on the control.
- Debris being deposited on the control.
- Scour to the control.
- Channel change.

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Cause and Effect

- Debris on the control happens during a recession and results in a negative shift.
- Scour to the control happens during a rise and results in a positive shift.
- Weed growth results in a negative shift increasing over time.
- Fallen tree, land slide, trash in the stream will result in a negative shift.

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What types of shifts are there?

- Constant shift – No change with time or stage.
- Time shift – Shift applied over time.
- Stage shift – Shift applied based on stage.

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When a shift – when a new rating?

- A shift is a ***temporary*** change to the control.
- If the change is ***permanent*** then a new rating should be drawn.

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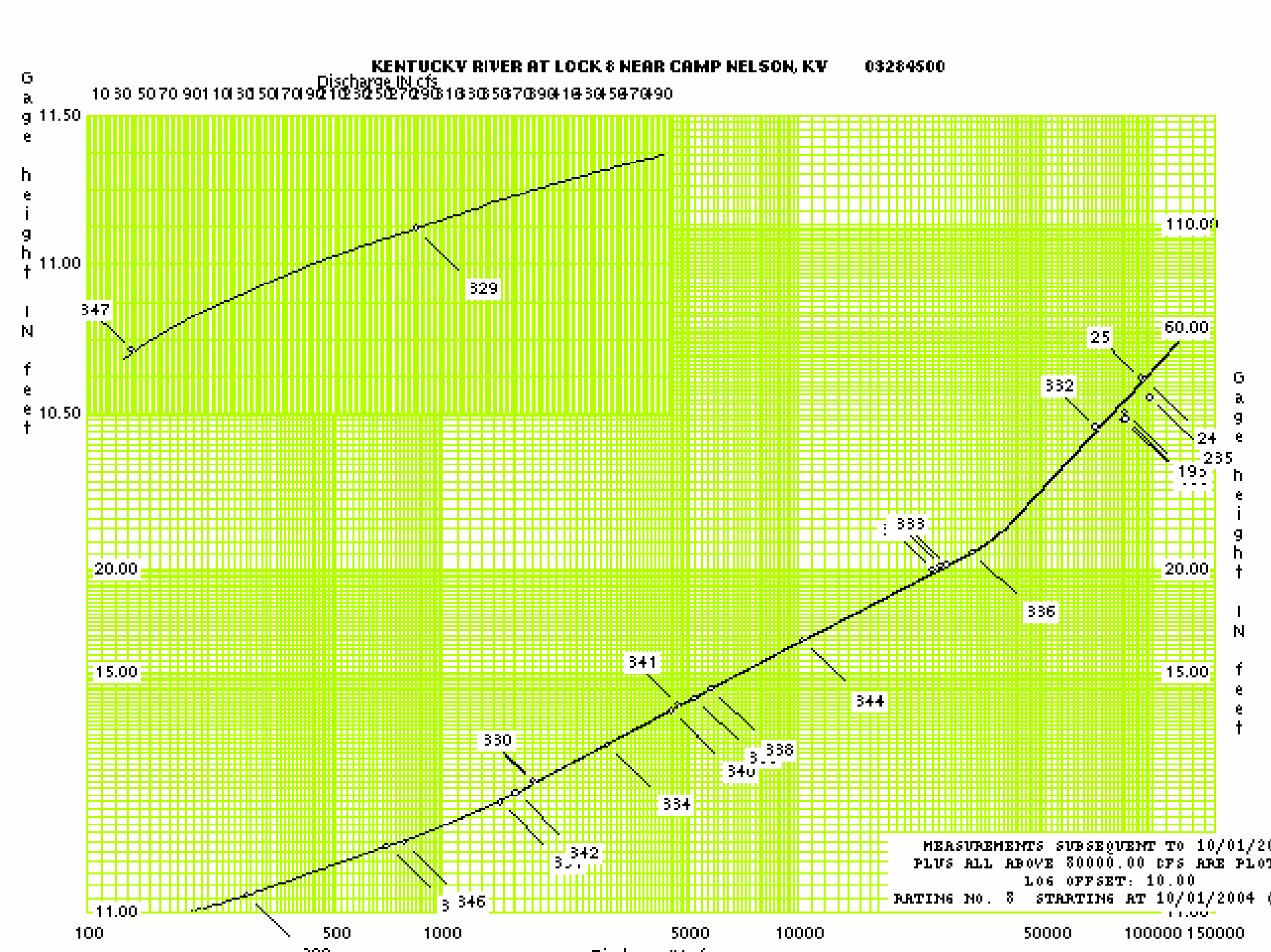
Concrete control
USGS
06/04/2003


Concrete control
USGS
06/26/2002


02/19/2004
Natural control
USGS


KENTUCKY RIVER AT LOCK 8 NEAR CAMP NELSON, KY 03284500
Discharge IN cfs
Gage height IN feet
11.50
11.00
10.50
20.00
15.00
11.00
110.00
60.00
20.00
15.00
347
329
25
332
24
235
333
336
341
344
330
338
340
334
342
346
100
500
1000
5000
10000
50000
100000
150000
MEASUREMENTS SUBSEQUENT TO 10/01/20
PLUS ALL ABOVE 80000.00 CFS ARE PLOT
LOG OFFSET: 10.00
RATING NO. 8 STARTING AT 10/01/2004

Causes of shifts

- Debris on the control such as leaves, sticks, trash, rock dam, beaver dam.
- Weed growth on the control
- Scour to the control

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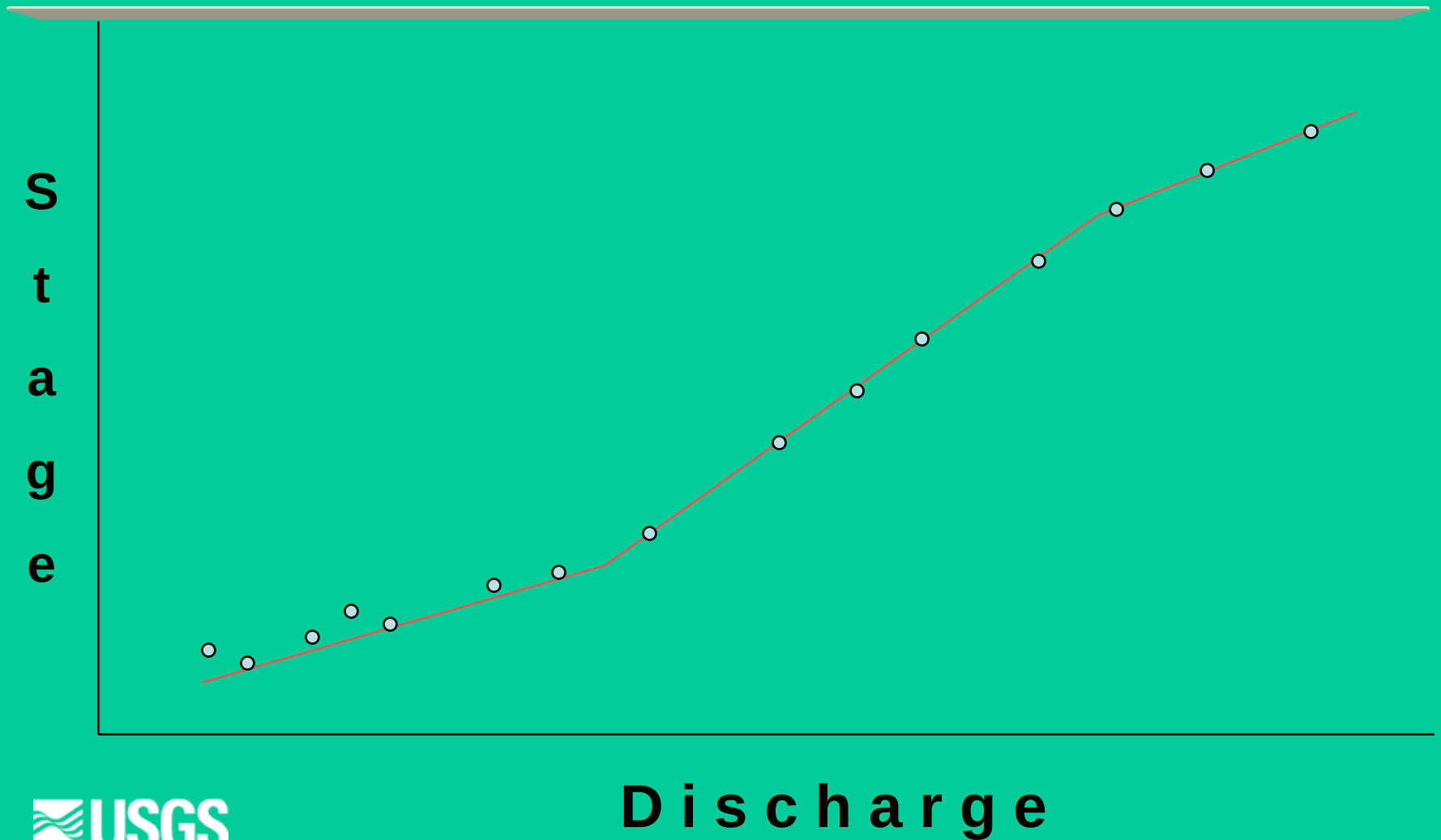
Compound Rating



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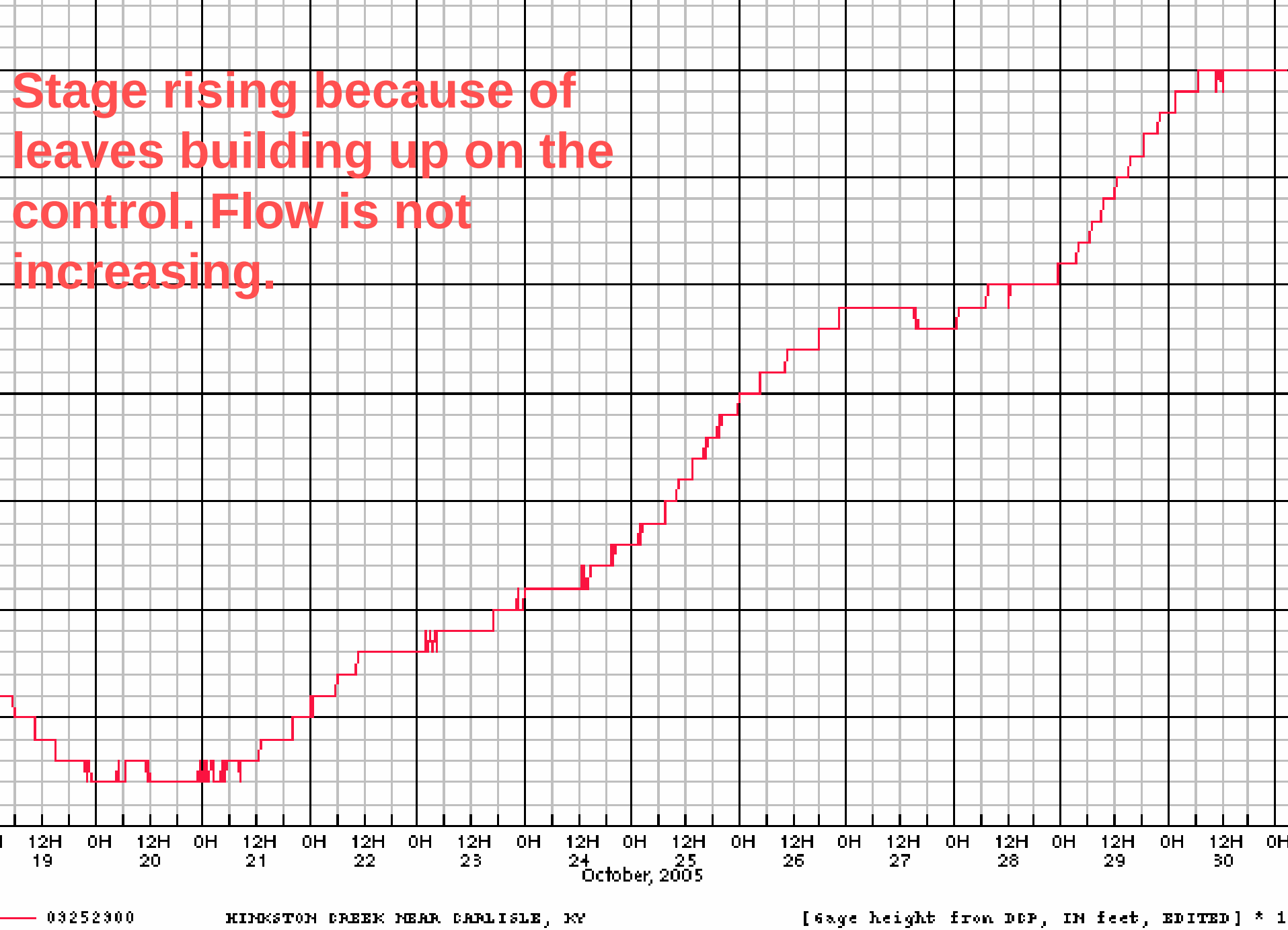

Stage rising because of leaves building up on the control. Flow is not increasing.
12H 19
0H
12H 20
0H
12H 21
0H
12H 22
0H
12H 23
0H
12H 24
0H
12H 25
0H
12H 26
0H
12H 27
0H
12H 28
0H
12H 29
0H
12H 30
0H
October, 2005
03252900 KINKSTON CREEK NEAR CARLISLE, KY
[Gage height from DCP, IN feet, EDITED] * 1


Natural control with light debris
10/14/2004


Natural control with moderate debris
11/18/2004


USGS
11/21/2002


Natural control, extreme low water control clean with moderate debris as the stage rises.
USGS
10/22/2003


Natural control with heavy debris
USGS
02/27/2003

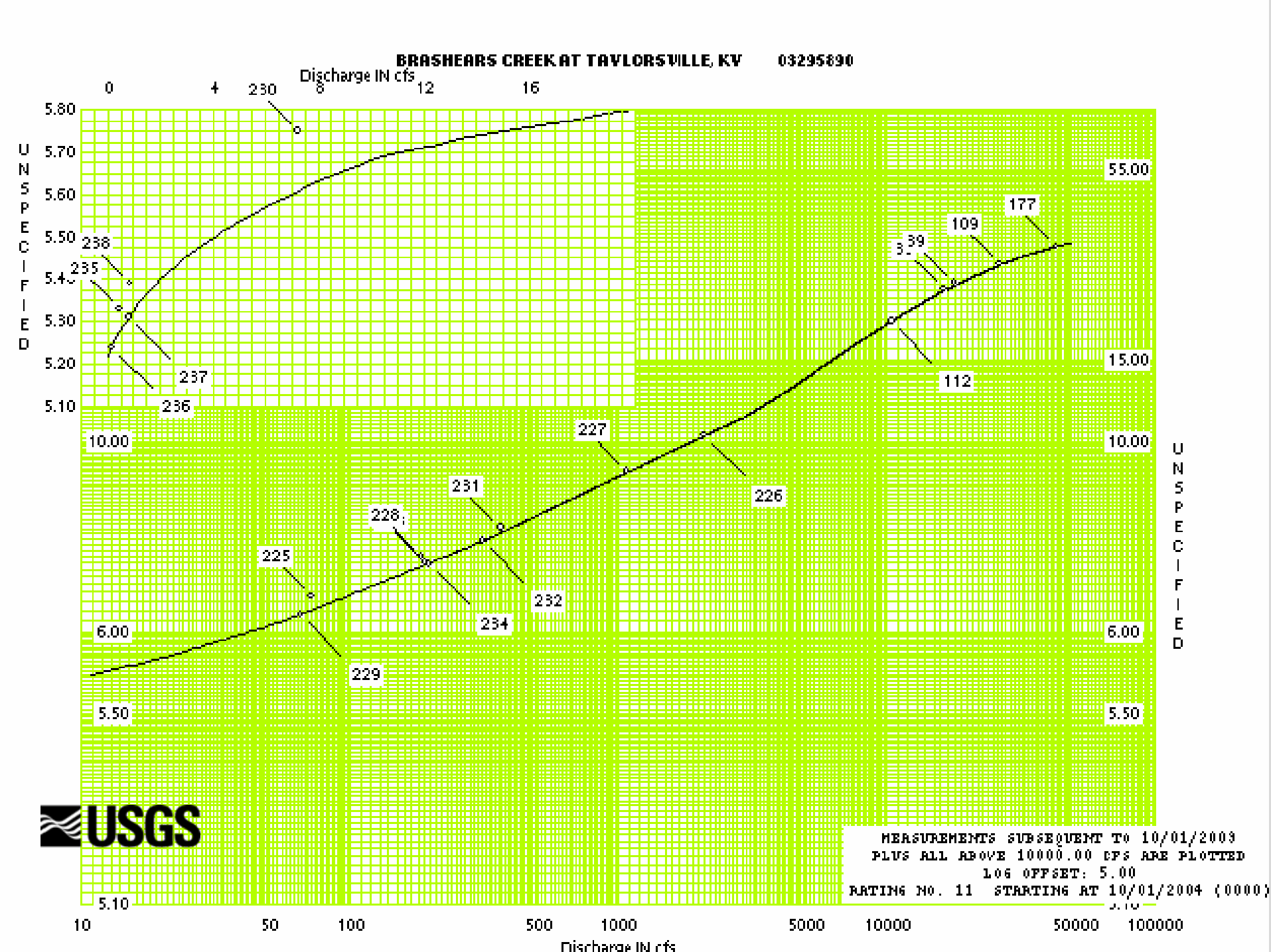

Heavy debris deposited at rail road bridge
USGS
02/19/2004

Man made rock dam


10/02/2002
Natural control with weed growth
USGS


Natural control with weed growth and algae
USGS
01/23/2002


Natural control with heavy weed growth
USGS
06/13/2002


BRASHEARS CREEK AT TAYLORSVILLE, KY 03295890
Discharge IN cfs
0
4
8
12
16
230
238
235
237
236
177
109
39
112
227
231
228
225
232
234
229
226
UNSPECIFIED
5.80
5.70
5.60
5.50
5.40
5.30
5.20
5.10
55.00
15.00
10.00
6.00
5.50
5.10
10
50
100
500
1000
5000
10000
50000
100000
Discharge IN cfs
USGS
MEASUREMENTS SUBSEQUENT TO 10/01/2003
PLUS ALL ABOVE 10000.00 CFS ARE PLOTTED
LOG OFFSET: 5.00
RATING NO. 11 STARTING AT 10/01/2004 (0000)

Applying a shift

- To correct for the debris on the control the rating is shifted to match the gage height, which in turn adjusts the rated discharge to match the correct measured flow. This is done gradually between measurements or during a hydrologic event depending on the cause of the shift.

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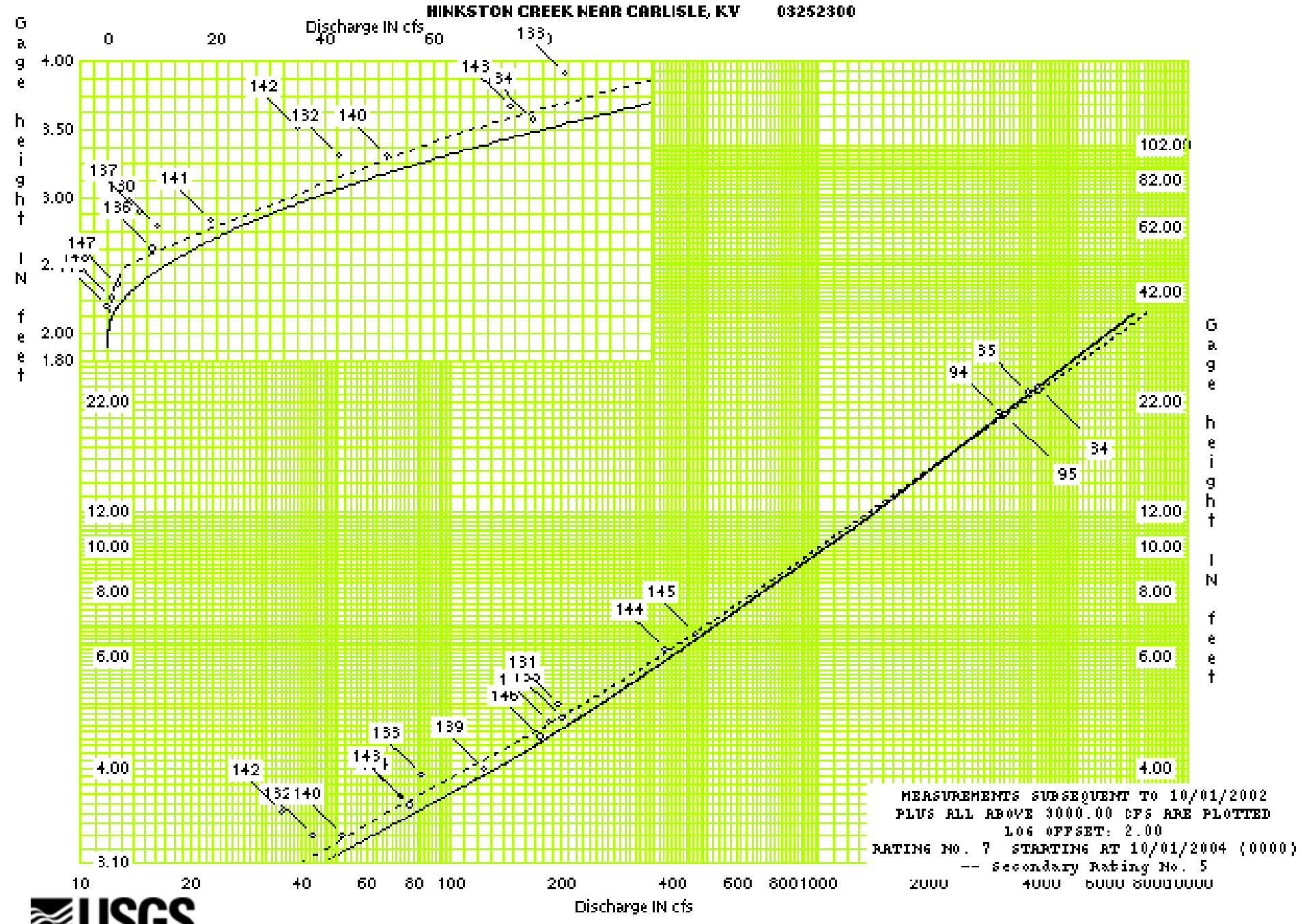
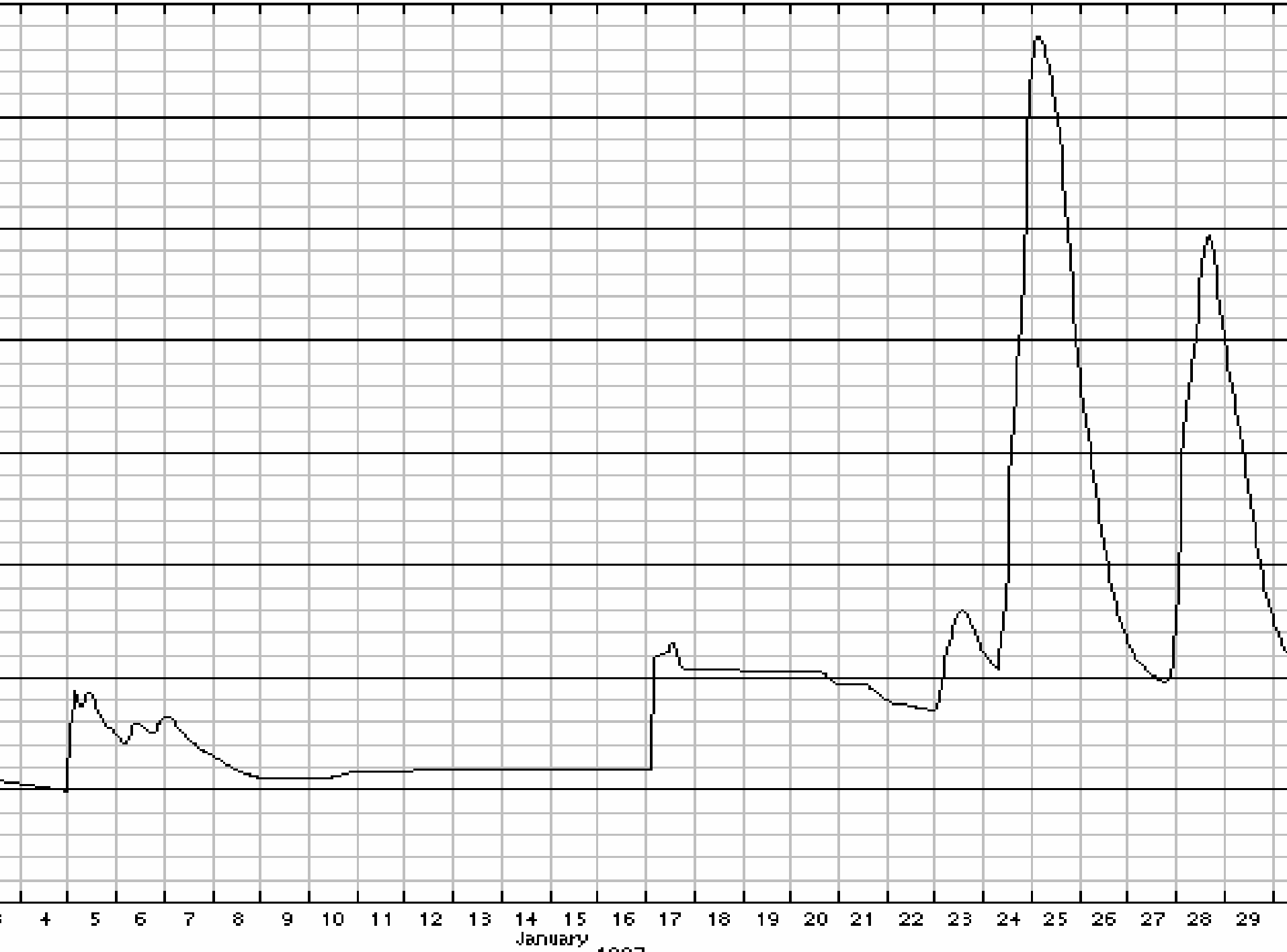

HINKSTON CREEK NEAR CARLISLE, KY 03252300
Gage height IN feet
Discharge IN cfs
0
20
40
60
4.00
3.50
3.00
2.00
1.80
133
143
34
142
132
140
137
130
141
136
147
22.00
12.00
10.00
8.00
6.00
4.00
3.10
102.00
82.00
62.00
42.00
22.00
12.00
10.00
8.00
6.00
4.00
35
94
34
95
145
144
131
146
139
133
143
142
132
140
Gage height IN feet
10
20
40
60
80
100
200
400
600
8001000
2000
4000
6000
8000
10000
Discharge IN cfs
MEASUREMENTS SUBSEQUENT TO 10/01/2002
PLUS ALL ABOVE 9000.00 CFS ARE PLOTTED
LOG OFFSET: 2.00
RATING NO. 7 STARTING AT 10/01/2004 (0000)
-- Secondary Rating No. 5
USGS


4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
January

Where to get more information

- Computation of Continuous Records of Stream flow Book 3 Chapter A13
- http://pubs.usgs.gov/twri/

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